NIRB Application for Screening #125305

Permafrost dynamics in response to climate change on Victoria Island, Nunavut

Application Type:	New
Project Type:	Scientific Research
Application Date:	4/3/2018 4:20:00 PM
Period of operation:	from 0001-01-01 to 0001-01-01
Proposed Authorization:	from 0001-01-01 to 0001-01-01
Project Proponent:	Stephanie Coulombe Polar Knowledge Canada CHARS Campus, 1 Uvajuq Road, PO Box 2150 Cambridge Bay Nunavut X0B0C0 Canada Phone Number:: 867-983-6676, Fax Number::

DETAILS

Non-technical project proposal description

English: Project title: Permafrost dynamics in response to climate change on Victoria Island, Nunavut.Project description:Permafrost (frozen ground) is very vulnerable to rapid changes in climate. As the climate warms, the ice in the permafrost melts and the ground becomes unstable as the soil collapse, causing landslides and coastal erosion. The rapid thawing of previously frozen ground can also disturb plant and animal habitats and impact water quality and the ecology of lakes. Decades of work led by various Canadian organizations provided insight into the changing state of permafrost landscapes. However, very little information exists on the permafrost conditions in the Central Canadian Arctic.It is in this context that Polar Knowledge Canada (POLAR) aims to start a research project to study the response of Victoria Island permafrost ecosystems to climate change and their environmental implications. This project will be anchored at the campus of the Canadian High Arctic Station (CHARS) located in Cambridge Bay. It will help collect baseline knowledge of permafrost and landscape changes in the Kitikmeot Region of Nunavut. Our field studies cover the southern part of Victoria Island, with a special focus on Cambridge Bay and its surrounding area.This research program has four specific objectives:(1)Characterize the permafrost conditions(2)Monitor changes in the landscape due to thawing permafrost(3)Assess the impacts of permafrost disturbances on the water quality of lakes and streams.The field methodology involves the following steps: 1-Monitor spatial changes in the landscape using a high-precision GPS and satellite images;2-Collect permafrost samples using a portable earth drill; 3-Characterize soil and permafrost using an electronic tool to image the subsurface;4-Measure and monitor the ground temperature using a series of sensors connected to a data logger;5-Characterize and sample sediments found at the land surface;6-Gather local knowledge on the changes that are happening across the Arctic landscape.The field team will use ATVs to access study sites located close to Cambridge Bay. The use of aircraft will allow the team to access remote locations. The project will primarily result in the publication of scientific papers, student theses and government reports, which will be available to the public. We will create a poster and a booklet to present and explain some of the changes happening to the environment in permafrost areas and how they affect people and wildlife, with the general goal of making permafrost science more accessible to the general public. On the long-term, this project aims to develop a monitoring program to measure various variables such as the ground temperature. These data will be useful for future community planning and to adapt to the thawing of permafrost.

French: N/A

Inuktitut: N/A

Inuinnaqtun: Havanguyuq taiguhia: Qiqumainnarniq qanugitni hugiaqninut hilap ahianguqnia tahamani Kiilliniq Qiqirtaq, Nunavut.Havanguyuq Unniqtuta:Qiqumainarniq (qiqumania maniqap) qanugililaqpiaq qilamik ahiangqunia hilap. Piplugu hila uunakpaliania, ta mna hiku qiqumainaqniani auktuqpaliania manigaqlu ingutaliqnia nuna anmukpalliqninanut, pipkaqnia hituvaliani tagiuplu hinaa huguqpaliania. Tamna qilamik auktuqpalianiq hivuani qiqumavaknia manigaq ulapihautaulaq nauhimayunut angutikhatlu nayuqpaktai aktuanilu imaqmun nakuunit uumatyutauvaluknitlu tahiqni. Ukiuni amihut havagiyaini hivuliqtauplutik allatqinit Kanatamiuni timiuyut piqaqtitai ihumagiyai tahamunga ahianguqni qanugitnit qiqumainnarnianut nunanut. Kihimik, tuhagakhaqattiangittuq tahamunga qiqumainnaqnianut qanugitnit tahamani Qitiqpahikniani Kanatamiut Ukiurtaqtuani.Piplugu una qanugitnigiya tapkuat Ukiuqtaqtulirinikkut Qauyimaniq Kanata (POLAR) pinahuat pigiaqni naunaiyaqni havanguyuq naunaiyagaunianut hugiaqni Kiilliniq Qikirtaq qiqumainnaqnia uumatyutit hilap ahianguqnianut avatiliqutailu qanugityutai. Una havanguyuq tunngatiqaqniaq talvani havakviani tapkuat Kanatamiuni Quttiktuq Ukiurtaqtuq Havakvia (CHARS) inilik talvani Ikaluktutiakmi. Ikayuqniaq katitiqninik humiumaititlugit ilitquhi ilihimani qiqumainnarniq munaplu ahianguqni tahamani Kitikmeotni Nunavut. Maniqami naunaiyainivut piniaqtai

tahamna nigiani ilagiya Kiilliniq Qikirtaq, pinahuaqniqhauplugu tamna Ikaluktutiak avatigiyalu nuna.Una naunaiyainiq havagut piqartuq hitamanik taihimayut ihumagiyaunit:(1)Pitquhit tapkuat qiqumainnaqni qanugitnit (2)Munagini ahianguqni nunap piplugu auktuqpaliani qiqumainnaqniq (3)Naunaiyaqni aktuani qiqumainnaqniq ulapihaqni imaqmun nakuunit tahiit kuugauyatlu.Tamna maniqami pityuhit ilalgit tahapkuninga tukligiknit: 1-Munagini attaqtunit ahianguqnit nunap atuqhugit nakuqpiaqtut-nalaumanit GPS qangattaqhimayutlu piksaliuqnit;2-Katitiqni qiqumainnaqnit naunayagat atquhugit nuktilat nunamun ikuutagutit; 3-Pitquhi nuna qiqumainnarniqlu atuqhugit alguyartuqtut hanalgutit piksaliuqninut maniqap qanga;4-Uuktugaqni munaginilu maniqami uunaqnia atuqhugit tukligit naunaiqtutit atatyutai tuhagakhanut titigautit;5-Pitquhi naunaiyagatlu nunavaluit nalvauyut talvani nunap qangani;6-Katitiqni nunalikni ilihimanit ahianguqninut atuqtut humiliqak Ukiurtaqtuq nunaani.Tapkuat maniqami havaqatigit atuqniaqtai Hantait tikitninut naunaiyaqvik inai inilgit qaningani Ikaluktutiak. Tamna atuqnia tingmit pipkalaqtai havaqatigit tikitni tikinagittut inait. Tamna havanguyuq piniqhauniaq qanugitninik tapkunani makpigaliugat naunaiyainiqmun makpigani, ilihaqtut titigaqtai kavamatkutlu tuhaqhitautai, tapkuat piyaulaqniat inungnit. Pinguqniaqtavut takuyakhaliuqni taiguakhat hatqiqtitninut unniqtuqnilu ahianguqnit atuqtauninut avatigiyauyumun qiqumainnaqninut nunat qanuqlu aktuani inungnut angutikhanutlu, pinahuarniqhauplugu pipkaqnia qiqumainnarniq naunaiyaut piyaulaqni quyagitnaq inungnut. Hivituyumun, una havanguyuq pinahuaq pivaliatitni munagiyauni havanguyuq piyangi aallatqit allatqikni tahapkuatut maniqap uunaqnia. Tahapkuat tuhagakhat atuqniaqaqpiaqniat hivunikhami nunalikni parnaiyainiq atuqpalianilu auktuqpaliani qiqumainnarniq.

Personnel

Personnel on site: 5
Days on site: 30
Total Person days: 150
Operations Phase: from 2018-05-29 to 2018-08-28

Activities

Activities

Location	Activity Type	Land Status	Site history	Site archaeological or paleontological value	Proximity to the nearest communities and any protected areas
Wollaston_Peninsula_NU	Scientific/International Polar Year Research	Inuit Owned Surface Lands	N/A	N/A	Cambridge Bay
Cambridge_Bay_study_area	Scientific/International Polar Year Research	Inuit Owned Surface Lands	N/A	N/A	Cambridge Bay, Ovayok Territorial Park.

Community Involvement & Regional Benefits

Community	Name	Organization	Date Contacted
Information is not available			

Authorizations

Indicate the areas in which the project is located

Authorizations

Regulatory Authority	Authorization Description	Current Status	Date Issued / Applied	Expiry Date
Nunavut Research Institute	Land and Water Research Application	Applied, Decision Pending		

Project transportation types

Transportation Type	Quantity	Proposed Use	Length of Use
Air	0	Helicopter	
Land	0	ATV	

Project accomodation types

Community

Material Use

Equipment to be used (including drills, pumps, aircraft, vehicles, etc)

Equipment Type	Quantity	Size - Dimensions	Proposed Use
Portable drill	1	1 m x 0.5 m x 1m	Collect undamaged permafrost samples
Ground penetrating radar (GPR)	1	1m x 1m x 1m	Non-invasive, subsurface investigation technique to map near-surface permafrost structures.
GNSS system	1	1m x 1m x1m	High-precision mapping
ATVs	5	2.5 m x 1.2m x 1.4 m	Travel to the study sites
Cessna 206	1	8.5m x 9m x 9m	Travel to remote study sites
Helicopter	1	12m x 10m x 3m	Local work nearby Cambridge Bay

Detail Fuel and Hazardous Material Use

Detail fuel material use:	Fuel Type	Number of containers	Container Capacity	Total Amount	Units	Proposed Use
Gasoline	fuel	3	20	60	Liters	Portable drill refuelling

Water Consumption

Daily amount (m3)	Proposed water retrieval methods	Proposed water retrieval location
0		

Waste

Waste Management

Project Activity	Type of Waste	Projected Amount Generated	Method of Disposal	Additional treatment procedures
Information is not available				

Environmental Impacts:

Drilling activities conducted for permafrost characterization will only take place in some specific areas. The potential impact would be of very local extent (approximately 15 m2) and non-permanent. The coring activities will have to be made in respect to the environment and our team is committed to act cautiously when it comes to drilling. In order to prevent soil contamination by leakage of fuel or oil, a spill-kit will always be readily available on-site prior to and during all drilling operations for an immediate clean up. A wooden board will always be used at the coring sites to protect the area around the boring hole where the active layer could be sensitive to multiple trampling. The drilling activities are always done with high environment cautiousness (e.g. spill kit, wooden boards, filling of the boring holes for permafrost to renew. As for our fieldwork activities related to mapping (GNSS) and ground-penetrating radar (GPR) surveys, the data acquisition is non-invasive, so there will be no environmental impacts.

Additional Information

SECTION A1: Project Info

SECTION A2: Allweather Road

SECTION A3: Winter Road

SECTION B1: Project Info

SECTION B2: Exploration Activity

SECTION B3: Geosciences

SECTION B4: Drilling

SECTION B5: Stripping

SECTION B6: Underground Activity

SECTION B7: Waste Rock

SECTION B8: Stockpiles

SECTION B9: Mine Development

SECTION B10: Geology

SECTION B11: Mine

SECTION B12: Mill

SECTION C1: Pits

SECTION D1: Facility

SECTION D2: Facility Construction

SECTION D3: Facility Operation

SECTION D4: Vessel Use

SECTION E1: Offshore Survey

SECTION E2: Nearshore Survey

SECTION E3: Vessel Use

SECTION F1: Site Cleanup

SECTION G1: Well Authorization

SECTION G2: Onland Exploration

SECTION G3: Offshore Exploration

SECTION G4: Rig

SECTION H1: Vessel Use

SECTION H2: Disposal At Sea

SECTION I1: Municipal Development

Description of Existing Environment: Physical Environment

Description of Existing Environment: Biological Environment

Description of Existing Environment: Socio-economic Environment

Miscellaneous Project Information

No research activities will take place within the boundaries of Ovayok Territorial Park.

Identification of Impacts and Proposed Mitigation Measures

Drilling activities conducted for permafrost characterization will only take place in some specific areas. The potential impact would be of very local extent (approximately 15 m2) and non-permanent. The coring activities will have to be made in respect to the environment and our team is committed to act cautiously when it comes to drilling. In order to prevent soil contamination by leakage of fuel or oil, a spill-kit will always be readily available on-site prior to and during all drilling operations for an immediate clean up. A wooden board will always be used at the coring sites to protect the area around the boring hole where the active layer could be sensitive to multiple trampling. The drilling activities are always done with high environment cautiousness (e.g. spill kit, wooden boards, filling of the boring holes for permafrost to renew. As for our fieldwork activities related to mapping (GNSS) and ground-penetrating radar (GPR) surveys, the data acquisition is non-invasive, so there will be no environmental impacts.

Cumulative Effects

Impacts

Identification of Environmental Impacts

Construction																								
-		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-
Operation																								
Scientific/International Polar Year Research		P	-	P	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-
Decommissioning																								
-		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-

(P = Positive, N = Negative and non-mitigatable, M = Negative and mitigatable, U = Unknown)